Responses to Comments - Parcel B
Draft Radiological Data Evaluation Findings Report for Parcels B and G Soil, September 2017
Former Hunters Point Naval Shipyard, San Francisco, CA

Reviewer	Date	Comment No.	Section/Figure	Comment	Response
DTSC	11/14/2017	1	General	Review of the FUs indicate there are a total of 112 FUs rather than 110 as indicated in the Report. Please review this information and correct if necessary	The number of fill units were reviewed and compared to the Parcel B SUPRs and 110 fill units were confirmed.
DTSC	11/14/2017	2	General	Evaluation forms were not included for ES 170, ES173, and ES335. Please explain.	Evaluation forms for ES170, ES173, and ES335 are included in Appendix C (see pages 584 through 607 of the Appendix C PDF).
DTSC	11/14/2017	3	General	Based on the U.S. EPA's review of the Parcel B Trench Units, with CDPH-EMBs concurrence, and the Navy's recommendation for resampling 17 FUs, we have determined that a total of 102 of 112 FUs require resampling rather than the 17 recommended by the Navy. This is a total of 91% of the total FUs in Parcel B. See the attached spreadsheet.	See response to EPA General Comment 17 for Parcel G: The purpose of this evaluation was to identify potential falsification and manipulation. Therefore, the evaluation did not identify whether ROD requirements were met, data quality issues, or work plan discrepancies. Because EPA's data review did identify these in their evaluation, the findings and recommendations differ. Therefore, it is recommended that Section 4.3 of the report include a discussion of the evaluation EPA conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report. The Navy will ensure that RAOs are achieved prior to completing a FOST and transferring property.
DTSC	11/14/2017	4	Section 2.1	Section 2.1 of the Report presents a brief description of the conceptual site model (CSM), however, it is not complete. This should be revised as is indicated in various final radiological removal action reports. For example, per the Final Radiological Removal Action Completion Report for Parcel B (March 2012, Section 2.2): *The CSM is based on the supposition that radioactive materials likely were discharged from numerous locations throughout HPNS into the storm drain and sanitary sewer systems and may have been released into surrounding soils during the course of normal operations and maintenance or repair activities (DON 2008). Manholes at HPNS have been found to be constructed of concrete and/or brick and appeared to be porous, likely resulting in the transport of contamination into the surrounding soil. Typically, the pipe sections were connected at HPNS by unsealed slip fittings at joints. Some leakage from the piping was anticipated when the storm drain and sanitary sewer systems were installed. Historical information indicates that the storm drain and sanitary sewers often were cleaned by power washing that may have forced radiological contamination out of the piping into the surrounding soils. The most recent power washing event was performed at HPNS in 1999. Power washing of these old sewer systems may easily have caused further cracks or breaks in the piping and subsequent migration of contamination into the surrounding soil. The migration and extent of radiological soil contamination at HPNS likely depended on how and where releases from the storm drain and sanitary sewer systems occurred.* This information is repeated in the Parcel G final radiological Removal Action Completion Report (December 2011).	This description from the 2008 CSM and 2011 and 2012 RACRs was incorporated into the text. The CSM will be updated in the draft work plan.
CDPH-EMB	11/15/2017	1	Parcel B Unit Former Building 114 Site (S0002) page 1, Logic Test 6	Observation: states, "Offsite lab samples for Sr-90 have 4 to 5 times the mass of the onsite gamma spec samples". Explain why the offsite lab samples, required 4 to 5 times the mass of the onsite gamma spec samples for Sr-90?	The mass was different because the samples sent to the offsite lab for Sr-90 and gamma spec analysis were assumed to be collected from the same location (same sample ID) but were physically different samples than those analyzed at the onsite lab. The form was updated for clarification.
CDPH-EMB	11/15/2017	2	Parcel B Building 130 (S0008) page 3 of 8, Gamma Static Data	Observations: states, "The data package for SU-008 in the FSSR reports 340 static gamma measurements ranged from -1,033 net gamma cpm to 1096 net gamma cpm, with mean value -192 and standard deviation 487. The gamma background was 6,899 cpm and the 3-sigma investigation level was 6,899 cpm. No measurements exceeded the investigation level. The investigation level was 4.2 standard deviations above the mean". Explain why, the Navy determined the investigation level as 4.2 standard deviations above the mean?	The focus of this project is to identify potential falsification and manipulation and the investigation levels used at the time were not evaluated. The investigation level discussion was included only as an observation.
CDPH-EMB	11/15/2017	3	Parcel B Building 130 (S0017) page 3 of 8, Gamma Static Data	Observations: states, "The data package for SU-017 in the FSSR reports 250 static gamma measurements ranging from -928 net gamma cpm to 1,807 net gamma cpm, with mean value-241 and standard deviation 447. The gamma background was 6,899 cpm and the sigma investigation level was 9,160 cpm. No measurements exceeded the investigation level. The investigation level was 4.5 sigma values above the mean." Explain why, the Navy determined the investigation level as 4.5 sigma values above the mean?	The focus of this project is to identify potential falsification and manipulation and the investigation levels used at the time were not evaluated. The investigation level discussion was included only as an observation.
CDPH-EMB	11/15/2017	4	Parcel B Former Building 142 SU 1 and 2	Explain why FSS systematic samples for both SUs collected on the same date (2/7/2006)?	There is no explanation provided in available documentation; however, the collection of 2 sets of samples on the same date at this former building site was not considered a line of evidence for potential falsification.
CDPH-EMB	11/15/2017	5	Parcel B Former Building 142 SU 1 and 2	Explain why both survey units had the same FSS samples 14 of 16 analyzed within 3 working days and two FSS samples analyzed within 1 working day?	There is no explanation provided in available documentation; however, the analysis spanning several working days at this former building site was not considered as a line of evidence for potential falsification.

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EPA	12/29/2017	21	General, Section 2.1	Section 2.1 of the Report presents a brief description of the conceptual site model (CSM). However, it is not complete. This should be revised to include more detail. The final Radiological Removal Action Completion Reports (RACRs) for Parcels B and G, Section 2.2 Conceptual Site Model, both cite the Navy Memorandum for the Record: Conceptual Site Model for the Removal of the Sanitary and Storm Sewers at Hunters Point Shipyard, December 17, 2008. Below are excerpts from that memo: Section 2, Background, p.1-2: "Contamination . . . could have come from rework and repair of radioluminescent devices (Ra-226 and Sr-90), NRDL [Naval Radiation Defense Laboratory] experimentation and development of radiation survey instrumentation (Ra-226, Cs-137, and Sr-90), or decontamination of ships that participated in atomic weapons testing. . . . radiological operations at HPS started in 1941 and concluded in 1974 with the closure of the shipyard. During this time, controls of radioactive materials, particularly involving radioluminescent devices, were much more relaxed than today's standards and any radiological operation could have potentially impacted the sewer system. . . . Slip fittings were used at pipe joints of the sewer system, therefore the lines were not sealed and some leakage from the pipe was expected when the system was built. Additionally, excavated manholes have been found to be porous. The potential for materials to migrate from piping and manholes into the surrounding soils is significant." Section 3b., Conceptual Site Model, p. 2: "Historically, the systems were cleaned, repaired, and replaced as necessary. In addition to potential normal seepage, all three of these operations could have released contaminations [sic] into soils surrounding the systems. In fact, cleaning was often accomplished by power washing that could have forced the contamination from the system and in some cases leave the piping free of contamination but the surrounding soils contaminated. . . . Power washing of old sewer systems easily cracks the pipes and allows for releases of pipe sediment into surrounding soils." Section 3c. Conceptual Site Model, p. 3: "To date, the removal action has demonstrated the accuracy of the conceptual site model." Section 3d. Conceptual Site Model, p. 4, shows that as of December 9, 2008, the Navy found 6.9% of contaminated soil in Parcel B (including Parcel D-2) trenches and 12.2% of Parcel G. This represented 93.8% of the Parcel B trench units and 58.5% of the Parcel G trench units. Section 4a Ongoing Removal Operations, p. 5: "93.8 percent of the sewer survey units in Parcel B . . . demonstrates the validity of the CSM [Conceptual Site Model]. Most contamination has been found in the soils surrounding the pipes, primarily below five feet. This is consistent with the pipe locations and the fact that repairs to the system or power washing would have resulted in the spread of contamination well beneath and beyond the piping system." EPA has also discussed site conditions with contractors that worked at Hunters Point and conducted oversight of removal action, and they provided the following information: a. During three attempts by the Navy while the shipyard was still in use to separate the storm drains and sanitary sewer lines, soil from piping would have been excavated and piled up beside the trenches and then returned to trenches. As a result, it is not possible to predict where contamination would be in the vicinity of the storm drains and sanitary sewers. b. It is also known that the sanitary sewers on Parcels G, D-1, and D-2 (formerly all part of Parcel D), and E were in very poor condition based on the large groundwater depression that formed in these areas. Groundwater entered the sanitary sewers through cracks and gaps in the piping. After the lift station pumping was terminated, it took many years for normal groundwater flow conditions to be established; remnants of this depression can be seen in Parcel E on the A- Aquifer groundwater elevation contour maps through November 2015. It is likely that differential settling and earthquakes caused the cracks and gaps in this system and that the storm drain system had similar cracks and gaps. c. Furthermore, the seagates in the storm drain system did not work well. As a result, it is possible that incoming tides moved contaminated sediment inland into lines that would not have been expected to have been contaminated. Numerous Parcel B and G forms indicate that sufficient sediment was present to sample and count in some lines. When radionuclide contamination was found above cleanup levels, the Base-wide Radiological Work Plan required that the bottom of the trench be sampled. This occurred in some trenches. d. Finally, much of the piping was found to be in poor condition and could not be removed intact from the SD/SS trench excavations. In some cases, the Parcels B and G forms note that there was shattered or broken piping. Any sediment in the bottom of this broken piping was likely mixed with the soil in the trenches, rather than being removed.	Section 2.1 was intended to present the investigation activities conducted and data collected by Tetra Tech EC that is being evaluated for potential falsification or manipulation rather than to present a comprehensive CSM. The CSM from the RACR is based on Tetra Tech EC's data and the CSM was updated during the January 17-18, 2018 meeting and presented in the draft work plan, in preparation for re-sampling activities. Some additional details on the potential sources of radiological contamination was added to Section 2.1 per DTSC comment 4.

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				This Conceptual Site Model is the basis for selection in the Parcels B and G the Records of Decision (RODs) for Parcels B and G of alternative R-2, the Workplan that Tetra Tech EC, Inc., was required to follow, over alternative R-1, which was "No action." For Parcels B and G, no alternative between these levels of effort was analyzed. Please revise Section 2.1 to add more detail such as information in the above record about the Conceptual Site Model.	
EPA	12/29/2017	22	General, Section 2.3, Release Criteria	Regarding background, the 2008 Navy Memo cited in the previous comment states the following in Section 3e(2)(a), p. 4: "There is always the possibility of naturally occurring radioactive material (NORM), however the types of contamination found in the sewer excavations do not fit the profile of NORM. This has been carefully monitored by the Navy to ensure there is no need to change the CSM. One method in use is comparison of the Ra-226 activity with the U-238 activity. This is based on the assumption that when Ra-226 is naturally occurring it exists in equilibrium with U-238. Theoretically, if two isotopes are in secular equilibrium the activities should be the same and thus the ratio of the activities should be 1 to 1. If Ra-226 was introduced into an environment by a man-made device or a contamination event then the ratio of Ra-226 relative to U-238 should be biased high by the amount of Ra-226 deposited." Section 3e(2)(b), p. 4: "For Parcel B, . . . the U-238 activity was consistently lower than the Ra-226 activity by a significant margin. The U-238 activity ranged from 10 to 60 percent of the Ra-226 results. . . from the Parcel G . . . The U-238 activity were 30 and 50% of the Ra-226 results. These results would indicate that although there is some small amount of Ra-226 naturally occurring in the HPS [Hunters Point Shipyard] soil the bulk of the Ra-226 activity was introduced by man-made sources. Based on the U-238 to Ra-226 ratios at Parcels B and G, the current CSM for HPS is correct and the majority of radioactive materials at the base is from man-made sources, and is not NORM." Section 5a(4) Summary: "The analysis of the Ra-226 and U-238 ratios for in [sic] Parcel B pipe sediment indicate the presence of radium contamination not the possibility of higher levels of naturally occurring radioactive material" Please revise Section 2.3 to include the information above to be consistent with the Navy's record about naturally occurring background.	Section 2.3 was intended to present the release criteria used by Tetra Tech EC during the storm drain and sanitary sewer line investigation. The sections quoted in the comment from the 2008 Navy Memo are based on Tetra Tech EC's data in which there is evidence of potential falsification. In Section 4, this statement was revised/added to: "After carefully examining the analytical data and conceptual site model for soil contamination, it is suspected that the upper range of naturally-occurring Ra-226 may exceed the release criteria. Therefore, the subsequent work plan will describe a method to determine whether Ra-226 is in equilibrium with its parent, U-238. If Ra-226 and U-238 are in equilibrium, it may be assumed that the Ra-226 is not due to contamination." Collection of new background data is planned and the SAP, work plan, and task-specific plans will detail how data will be evaluated.
EPA	12/29/2017	23	General, Section 2.4 Anomalous Soil Samples Report	This work represents the only resampling of potentially falsified data from Tetra Tech EC, Inc., that has been conducted to date. That report stated for Building 517 Survey Unit 2, "The systematic sample results [from resampling] are substantially more elevated than the anomalous [previously reported] set of systematics, suggesting that the anomalous set of systematic samples is not representative of its respective survey unit." (p. ES-4). Please summarize the extent to which the new results from resampling exceeded the results originally reported, which were potentially falsified. For example: What percentage of the new results exceeded the previously reported results? By how much? At how many locations did the new results from sampling exceed the release criteria? What percentage of the total exceedances did that represent? Also, please add that concentrations above the release criteria were found during resampling, as new excavations were conducted in five locations base wide.	Building 517 Survey Unit 2 is located in Parcel E; therefore, this data is discussed in Section 2.4 of the Parcel E report.
EPA	12/29/2017	24	General, Section 2.5 Former Worker Allegations	Please add language that states that former workers alleged that Tetra Tech EC, Inc. generally tried to under-represent the true extent of exceedances of cleanup levels in its falsification activities. Please note in the report that the Navy, EPA, DTSC, and CDPH reviews of this report have found examples of data patterns that would be consistent with these allegations. Please also note in the report that all the worker allegations listed in this section already would suggest that if sampling been performed according to the original work plan using the original analytical methods, more evidence of contamination could have been found than was originally presented.	The first bullet of Section 2.5 reflects the notion of under-representing data. The statement "The Navy, USEPA, DTSC, and CDPH review of this report have found examples of data patterns that are potentially consistent with allegations presented in Section 2.5." was added to Section 4.3. The purpose of this evaluation was to identify potential falsification and manipulation and based on the evaluation conducted, it cannot be assumed that if sampling was performed according to the original work plan, more evidence of contamination could have been found.
EPA	12/29/2017	25	General, Section 3, Data Evaluation Activities	The data evaluation of buildings found duplication of data, which confirms one of the allegations from a former worker. It is possible that duplication of data occurred in soil data as well. Please describe the Navy's efforts to search for evidence of duplication in soil data, including both gamma scan and laboratory data. Please also note what aspects of soil data the Navy did not search for duplication and explain why these data were not searched for duplication.	For laboratory soil data, repeated numbers tests and frequency tests were conducted and there was no evidence of data manipulation. Gamma scan data was not available in an electronic format to facilitate these tests. Only lines of investigation that resulted in evidence of data manipulation were included in the report.
EPA	12/29/2017	26	General, Section 4, Findings and Recommendations	See attached summary Tables 1 and 2 that combines the recommendations for resampling for trench, fill, and building site survey units for Parcels B and G, respectively. Please note that for both Parcel B and Parcel G, the EPA found significant similarities in the types of signs of falsification in survey units that the Navy recommended for resampling and those designated "No Further Action" by the Navy. EPA, DTSC, and/or CDPH recommended all of these survey units for resampling.	See response to EPA General Comment 17 (Parcel G tab): It is recommended that Section 4.3 of the report include a discussion of the evaluation EPA conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report.

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EPA	12/29/2017	27	General, Section 4.1.1, Parcel B Trench Units	EPA has reviewed Trench Unit forms that were labelled “no further action” in the draft. An attached spreadsheet shows the detailed review. The review did not find the magnitude of patterns of falsification found in Parcel G. However, the review did find more data quality issues with negative values and on-site versus off-site differences, which adds to some of the variability and “breaks” in slopes on the Q-Q plots. Of the 66 trench units that the Navy recommended for “No Further Action,” a quarter of them had missing gamma scan and static data and 9% showed differences in weight between samples sent to the onsite vs. offsite lab. Here are examples of other patterns observed in multiple trench units: · Bi-214 Final Status Survey (FSS) results (and often Ac-228 and K-40 as well) have low variability. This observation could be a sign of sample substitution or biasing samples to areas with known low activity. · Gamma static data has low range. This observation could be a sign that the meter was kept in one place. · Gamma static data inconsistent with Gamma scan data and FSS data · Q-Q plots indicate multiple populations · Many other concerns were found through data evaluation, and most trench units showed red flags of multiple types.	See response to EPA General Comment 17 (Parcel G tab): It is recommended that Section 4.3 of the report include a discussion of the evaluation EPA conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report.
EPA	12/29/2017	28	General, Section 4.1.2, Parcel B Fill Units	The Navy recommended resampling Trench Unit 057. Therefore these fill units that received fill from this suspect source should have correspondingly been recommended for resampling: OB206, OB219, OB222, and OB223. In addition, the USEPA, the DTSC, and CDPH analysis found more trench units that showed concerns and recommended those for resampling. Therefore the regulatory agencies have concluded that an additional 84 fill units require resampling because of a suspect source. These are listed in Spreadsheet 6 in the Parcel B workbook. Out of the remaining ten fill units, five show signs of falsification and/or data quality concerns. Please see Spreadsheet 5 in the Parcel B Workbook showing analysis of these ten remaining fill units. A total of 107 out of 112 fill units are therefore recommended for resampling.	Evidence of potential falsification or manipulation at a trench unit is not considered representative of a source and has no link to potential falsification or manipulation at a fill unit. Therefore, the recommendation for confirmation sampling at a trench unit was not considered directly related to the recommendation for excavated soil from that trench unit. The fill units were evaluated independently for evidence of potential falsification or manipulation. Comment noted. See response to EPA General Comment 17 (Parcel G tab): The purpose of this evaluation was to identify potential falsification and manipulation. Therefore, the evaluation did not identify data quality issues. Therefore, it is recommended that Section 4.3 of the report include a discussion of the evaluation EPA conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report.
EPA	12/29/2017	29	General, Section 4.1.3. Parcel B, Current and Former Building Sites	The CDPH has reviewed survey units in building sites and has recommended resampling all units except Building 157, Survey Unit 7. EPA has conducted an independent review of this analysis and concurs with it. In addition, please note that Building Site 157, SU7, was a class 2 survey unit. The plots show some anomalies, Bi-214 FSS_SYS had low variability, there were slope breaks in the K-40 FSS_SYS data set, and low variability was noted for the gamma statics (about 1200 counts per minute [cpm]). However, any contamination in this area is more likely associated with Trench Units 50 and 50A (which cross through SU 7) and was addressed separately, so contamination in SU 7 is less likely. CDPH recommends SU 6 for resampling, and SU 7 surrounds SU 6. If contamination is found in SU 6, then SU 7 should become a Class I SU. Since it was previously a Class 2 SU, it would have to be rescanned and sampled according to the Class 1 criteria.	See response to EPA General Comment 17 (Parcel G tab): It is recommended that Section 4.3 of the report include a discussion of the evaluation EPA and CDPH conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report.
EPA	12/29/2017	30	General, Section 4.2.1, Parcel G Trench Units	In Parcel G, in nearly a third of all 63 Parcel G trench units, post remediation gamma scans indicated a need for biased samples to be collected, but they were not. Out of the 43 trench units that the Navy designated for “no further action:” · Over half had inconsistencies between gamma scan and static data and over one-third had other types of inconsistencies (e.g. on-site and off-site results differ by more than 10X, plots showed signs that multiple populations likely in the data set, etc.) · In a third, the narrow range of gamma static data indicates measurements were not collected from different locations as required. · In six, some data were missing so some evaluations could not be done. · In a few trench units, biased sample results appeared lower than other data sets, which is the opposite of what we would expect. And in a few more, the Navy’s report described a finding of potential falsification in one aspect of the work but still did not flag for resampling. · Many other concerns were found through data evaluation, and most trench units showed red flags of multiple types.	See response to EPA General Comment 17 (Parcel G tab): It is recommended that Section 4.3 of the report include a discussion of the evaluation EPA conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report.
EPA	12/29/2017	31	General, Section 4, Findings and recommendations	The review looked for both signs of falsification and signs of data quality concerns. A survey unit sometimes shows signs of one or the other or both or neither. One of the tabs in the attached spreadsheets for Parcels B and G separates the findings for these categories for each survey unit.	Comment noted. See response to EPA General Comment 17 (Parcel G tab): The purpose of this evaluation was to identify potential falsification and manipulation. Therefore, the evaluation did not identify data quality issues. Therefore, it is recommended that Section 4.3 of the report include a discussion of the evaluation EPA conducted with differing results based on professional judgement, and to include the comments and evaluation in an appendix to the report.

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EPA	12/29/2017	12	Specific, Appendix C	For the next Parcels to be evaluated, we suggest that you only plot the off-site laboratory data on the box plots and Q-Q plots to eliminate that source of variability in the reviews.	Based on the schedule for reporting, the requested box and Q-Q plots can be provided with submittal of the final documents.